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EXAMINER	
SMITH, JOSHUA Y	

ART UNIT	PAPER NUMBER
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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/567,001	Applicant(s) HAN ET AL.	
	Examiner JOSHUA SMITH	**Art Unit** 2419	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

The preliminary amendment filed 01/31/2006 has been entered.

- **Claims 1-40 are pending.**
- **Claims 1-40 stand rejected.**

Claim Objections

1. **Claim 9** is objected to because of the following informalities: Claim 9 states in its 4th to 5th lines: "at **leas tone** indicator" (emphasis added). This appears to be a typographical error, and it appears that the excerpt should state ***at least one indicator***. Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claim 11** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

3. **Claim 11** states "writing to the **local memory information on one output queue for the handle written to the memory** indicating the output queue to which the destination packet generated from the indicator addressed by the handle is queued"

(emphasis added by examiner). The specification does not adequately disclose what "local memory information" is, and the specification does not adequately disclose what "information on one output queue" is, and the specification does not adequately disclose how an "output queue" is involved "for the handle written to the memory", and the specification does not adequately disclose "information ... indicating the output queue to which the destination packet generated from the indicator addressed by the handle is queued", in such a manner that one skilled in the art at the time of the invention could make and use the claimed invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claim 11** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. **Claim 11** states "writing to the **local memory information on one output queue for the handle written to the memory** indicating the output queue to which the destination packet generated from the indicator addressed by the handle is queued" (emphasis added by examiner). This is indefinite since it is unclear what "local memory information" is, it is unclear what "information on one output queue" is, it is unclear how an "output queue" is involved "for the handle written to the memory", and it is unclear what "information ... indicating the output queue to which the destination packet generated from the indicator addressed by the handle is queued" is. Examiner will treat

the above excerpt to indicate ***writing, to a local memory, information that indicates the output queue to which a destination packet is queued, where the destination packet is generated from the indicator addressed by the handle***.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

    1. Determining the scope and contents of the prior art.
    2. Ascertaining the differences between the prior art and the claims at issue.
    3. Resolving the level of ordinary skill in the pertinent art.
    4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. **Claims 1-25 and 29-40** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hassan-Ali et al. (Patent No.: US 7,280,542 B2) in view of Boivie (Patent No.: US 7,079,501 B2), Verplanken et al. (Patent Number: 6,038,592), and Tsuchiya et al. (Pub. No.: US 2002/0093960 A1), hereafter respectively referred to as Hassan-Ali, Boivie, Verplanken, and Tsuchiya.

4. **In regard to Claim 1**, Hassan-Ali teaches in column 9, lines 20-25, and in FIG. 4, reference numeral 402 (FIG. 4) refers to an interface that receives an ingress flow 403

(i.e., the root) (FIG. 4) (receiving a multicast packet) that is to be scheduled for emission to N egress interfaces 406-1 through 406-N (FIG. 4) (a multicast packet to transmit to destination addresses), where an ingress flow 403 (FIG. 4) is referred to as a root flow and MC (multicast) flows emitted to egress interfaces are referred to as leaf flows, and, in column 2, lines 51-63, where multicasting is supported in an environment, a single source of traffic (i.e., a root) emits cells or packets to a number of destinations (i.e., leaves) (transmit to destination addresses) that receive the replicated traffic (receiving a multicast packet to transmit to destination addresses).

5. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a descriptor addressing a packet entry in a packet memory including a payload to transmit to destination addresses), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (generating a descriptor addresses a packet entry in a packet memory including a payload to transmit to destination addresses).

6. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf and root flow index values (for a

destination address and a descriptor) (generating, for a destination address, an indicator for a destination address and a descriptor, wherein indicators for destination addresses address descriptors).

7. Hassan-Ali fails to teach generating headers for destination addresses.

8. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generating a header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generating a header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generating a header) for those destinations (generating headers for destination addresses).

9. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Boivie with the invention of Hassan-Ali since Boivie provides a method for efficiently delivering content to multiple requesters over a

communications network and allows a server to handle more requests without increasing the actual bandwidth of a connection between the server and the Internet (see Boivie, column 1, lines 7-10 and 43-46), which can be introduced into the system of Hassan-Ali to provide efficient scheduling for handling user requests to servers in a network that employs the system Hassan-Ali in network nodes.

10. Hassan-Ali fails to teach generating an indicator including information on a message.

11. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (generating an indicator including information on a message).

12. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

13. Hassan-Ali fails to teach information on a header for a destination address.

14. Tsuchiya teaches in paragraph [0032], the length of an IPv4 header itself is stored into a "Header Length" field (information on a header for a destination address).

15. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Tsuchiya with the invention of Hassan-Ali since Tsuchiya provides a method and apparatus of executing IP multicast communications between an IPv4 terminal and an IPv6 terminal (see Tsuchiya, paragraph [0004]), which can be introduced into the system of Hassan-Ali to allow multicast packets to be transferred between different IP networks and to allow multicast communications between users of different IP protocols.

16. **In regard to Claim 2**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a descriptor is generated for each packet entry including a payload), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (a descriptor is generated for each packet entry including a payload).

17. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an

index portion 514A (FIG. 5) associated with a pointer location portion 514B (a descriptor) and relating to the leaf and root flow index values (an indicator is generated for a descriptor and a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

18. Hassan-Ali fails to teach a payload is written to multiple packet entries in a packet memory.

19. Verplanken teaches in column 12, lines 37-39, and in FIG. 9, two data buffers (10) and (11) (FIG. 9) which are stored in a data store represent a message of a user (a payload is written to multiple packet entries in a packet memory).

20. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

21. **In regard to Claim 3,** as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address, and an indicator for a destination address, and an indicator corresponding to a descriptor addressing an entry in a packet memory including payload data for a destination address.

22. Hassan-Ali fails to teach a next handle in indicators for a destination address to point to an indicator corresponding to a next entry in a packet memory including further payload data for a destination address.

23. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (DCB) (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a next buffer address field (a next handle in a an indicator) of 2 bytes, where this field is used to chain the DCBs, and then their associated data buffers (a next entry in a packet memory including further payload data for a destination address), in a user queue, where then the chained buffers form a message (a next handle in indicators for a destination address to point to an indicator corresponding to a next entry in a packet memory including further payload data for a destination address).

24. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

25. **In regard to Claim 4**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing

pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a payload is written to a packet entry in a packet memory), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (a payload is written to a packet entry in a packet memory, a descriptor is generated for a packet entry including a payload).

26. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf flow index values (a destination address to which a payload in a packet entry addresses by a descriptor is transmitted) (an indicator is generated for a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

27. **In regard to Claim 5**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplankenm, and Tsuchiya teaches a generated indicator.

28. Hassan-Ali fails to teach a handle for each generated indicator addressing an indicator in a queue.

29. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number ‘0’ (an indicator in a

queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (addressing an indicator) (a handle for each generated indicator addressing an indicator in a queue).

30. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

31. **In regard to Claim 6**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address and an indicator associated with a destination address, a header for a destination address, payload from an entry in a packet memory associated with an indicator and a header for a destination address.

32. Hassan-Ali teaches in column 9, lines 12-16, and in FIG. 1 and FIG. 4, a multicast (MC) flow arrangement (FIG. 4) where a root flow entering an ATM environment, e.g., the ATM switch fabric of the access node 100 shown in FIG. 1, is

transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (transmitting a payload and a header).

33. Hassan-Ali fails to teach using information on a message in an indicator to access a message.

34. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (using information on a message in an indicator to access a message).

35. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

36. **In regard to Claim 7**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address, a header for a destination address, accessing a header for a destination address from an entry in a

packet memory addressed by a descriptor identified in an indicator for a destination address.

37. Hassan-Ali teaches in column 9, lines 12-16, and in FIG. 1 and FIG. 4, a multicast (MC) flow arrangement (FIG. 4) where a root flow entering an ATM environment, e.g., the ATM switch fabric of the access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (transmitting, for each destination address, a payload from an entry in a packet memory and a accessed header for a destination address).

38. Hassan-Ali fails to teach using, for each destination address, a message length and offset from an indicator for a destination address to access a header for a destination address from an entry in a packet memory.

39. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an offset from an indicator) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) of 2 bytes which gives a number of bytes used in a message (a message length from an indicator) (using, for each destination address, a message length and offset from an indicator for a destination address to access a header for a destination address from an entry in a packet memory).

40. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since

Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

41. **In regard to Claim 8**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a header and a destination address for which an indicator is generated.

42. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5), where root cells (header and payload) are stored, or written to, cell memory locations (entry in a packet memory) using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (writing headers to each entry in a packet memory including packet payload).

43. Hassan-Ali fails to teach a generated header.

44. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generated header),

and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generated header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generated header) for those destinations (generated headers).

45. Hassan-Ali fails to teach information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated.

46. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (offset) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (message length) of 2 bytes which gives a number of bytes used in a message (message length) (information on a message in an indicator for a destination address includes a message length and offset used to extract a

message from an entry in a packet memory for a destination address for which an indicator is generated).

47. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

48. **In regard to Claim 9**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a payload and an entry in a packet memory addresses by a descriptor identified in an indicator for a destination address.

49. Hassan-Ali fails to teach information on a message length and message offset used to extract a message from an entry for a destination address for which an indicator is generated, and using, for each destination address, a message length and offset in an indicator for a destination address to access a message for a destination address from an entry in a packet memory.

50. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an offset from an indicator) of 1 byte which indicates the beginning of data in that

buffer, and a total message count field (FIG. 3A) of 2 bytes which gives a number of bytes used in a message (a message length from an indicator) (information on a message length and message offset used to extract a message from an entry for a destination address for which an indicator is generated, and using, for each destination address, a message length and offset in an indicator for a destination address to access a message for a destination address from an entry in a packet memory).

51. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

52. **In regard to Claim 10**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches an indicator for a destination address.

53. Hassan-Ali fails to teach writing to a local memory a handle for a destination address addressing an indicator, queuing indicators corresponding to handles in an output queue to a packet queue.

54. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' from FDQCB

(queuing indicators in an output queue to a packet queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (indicators corresponding to handles) (writing to a local memory a handle for a destination address addressing an indicator, queuing indicators corresponding to handles in an output queue to a packet queue).

55. Hassan-Ali fails to teach writing handles in local memory to an output queue.

56. Verplanken teaches in column 8, lines 58-60, a next buffer address in an indirect control block is empty except when an indirect control block (handle) is enqueued in a FICBQ (queue) (writing handles in local memory to an output queue).

57. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

58. **In regard to Claim 11**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination packet and an indicator.

59. Hassan-Ali fails to teach information that indicates an output queue to which a destination packet generated from an indicator addressed by a handle is queued.

60. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-42 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number ‘0’ (an indicator in a queue), and data buffer (10) and (11) (a destination packet) are respectively associated to direct control blocks (12) and (13) (indicators), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (writing, to a local memory, information that indicates an output queue to which a destination packet generated from an indicator addressed by a handle is queued).

61. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

62. **In regard to Claim 12**, as discussed in the rejections of Claims 1 and 10, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches writing a payload,

generating headers, generating a descriptor, generating an indicator, writing handles to a local memory, and writing handles to an output queue, and indicators for a destination address.

63. Hassan-Ali teaches in column 4, lines 50-65, and in column 9, lines 12-16, and in FIG. 1 and FIG. 4, an ATM switch fabric 102 (FIG. 1) (a packet processing block performs operations), where an overall functionality of the switch fabric 102 includes: policing; operation, administration and maintenance (OAM); header translation; queuing; scheduling and traffic shaping; and Connection Admission Control (CAC), and traffic to the fabric 102 is provided via a number of interfaces (operations), and FIG. 4 depicts an exemplary multicast (MC) flow arrangement where a root flow entering an ATM environment, e.g., an ATM switch fabric of an access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces (a transmission block) using a corresponding number of leaf flows (a packet processing block performs operations, a transmission block).

64. Hassan-Ali fails to teach handles to access indicators for a destination address to send a message to a destination address.

65. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' (an indicator in a queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field

represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (addressing an indicator) (handles to access indicators for a destination address to send a message to a destination address).

66. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

67. **In regard to Claim 13**, Hassan-Ali teaches in column 9, lines 20-25, and in FIG. 4, reference numeral 402 (FIG. 4) refers to an interface that receives an ingress flow 403 (i.e., the root) (FIG. 4) (receiving a multicast packet) that is to be scheduled for emission to N egress interfaces 406-1 through 406-N (FIG. 4) (a multicast packet to transmit to destination addresses), where an ingress flow 403 (FIG. 4) is referred to as a root flow and MC (multicast) flows emitted to egress interfaces are referred to as leaf flows, and, in column 2, lines 51-63, where multicasting is supported in an environment, a single source of traffic (i.e., a root) emits cells or packets to a number of destinations (i.e., leaves) (transmit to destination addresses) that receive the replicated traffic ((i) receive a multicast packet to transmit to destination addresses).

68. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a packet memory) (a packet memory, (ii) write a payload of a multicast packet to a packet entry in a packet memory), a descriptor addressing a packet entry in a packet memory including a payload to transmit to destination addresses), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service ((iv) generating a descriptor addresses a packet entry in a packet memory including a payload to transmit to destination addresses).

69. Hassan-Ali teaches in column 4, lines 50-65, and in column 9, lines 12-16, and in FIG. 1 and FIG. 4, an ATM switch fabric 102 (FIG. 1) (a packet processing block performs operations), where an overall functionality of the switch fabric 102 includes: policing; operation, administration and maintenance (OAM); header translation; queuing; scheduling and traffic shaping; and Connection Admission Control (CAC), and traffic to the fabric 102 is provided via a number of interfaces (operations), and FIG. 4 depicts an exemplary multicast (MC) flow arrangement where a root flow entering an ATM environment, e.g., an ATM switch fabric of an access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (circuitry in communication with a packet memory and enabled to perform operations).

70. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf and root flow index values (for a destination address and a descriptor) ((v) generate, for a destination address, an indicator for a destination address and a descriptor, wherein indicators for destination addresses address descriptors).

71. Hassan-Ali fails to teach generate headers for destination addresses.

72. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generating a header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generating a header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop,

and a request specific header information (generating a header) for those destinations ((iii) generate headers for destination addresses).

73. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Boivie with the invention of Hassan-Ali since Boivie provides a method for efficiently delivering content to multiple requesters over a communications network and allows a server to handle more requests without increasing the actual bandwidth of a connection between the server and the Internet (see Boivie, column 1, lines 7-10 and 43-46), which can be introduced into the system of Hassan-Ali to provide efficient scheduling for handling user requests to servers in a network that employs the system Hassan-Ali in network nodes.

74. Hassan-Ali fails to teach generate an indicator including information on a message.

75. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (generate an indicator including information on a message).

76. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to

execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

77. Hassan-Ali fails to teach information on a header for a destination address.

78. Tsuchiya teaches in paragraph [0032], the length of an IPv4 header itself is stored into a "Header Length" field (information on a header for a destination address).

79. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Tsuchiya with the invention of Hassan-Ali since Tsuchiya provides a method and apparatus of executing IP multicast communications between an IPv4 terminal and an IPv6 terminal (see Tsuchiya, paragraph [0004]), which can be introduced into the system of Hassan-Ali to allow multicast packets to be transferred between different IP networks and to allow multicast communications between users of different IP protocols.

80. **In regard to Claim 14**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a descriptor is generated for each packet entry including a payload), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and

additional root flow cells as they are enqueued for a MC (multicast) service (a descriptor is generated for each packet entry including a payload).

81. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) associated with a pointer location portion 514B (a descriptor) and relating to the leaf and root flow index values (an indicator is generated for a descriptor and a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

82. Hassan-Ali fails to teach a payload is written to multiple packet entries in a packet memory.

83. Verplanken teaches in column 12, lines 37-39, and in FIG. 9, two data buffers (10) and (11) (FIG. 9) which are stored in a data store represent a message of a user (a payload is written to multiple packet entries in a packet memory).

84. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

85. **In regard to Claim 15**, as discussed in the rejection of Claim 13, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address, and an indicator for a destination address, and an indicator corresponding to a descriptor addressing an entry in a packet memory including payload data for a destination address.

86. Hassan-Ali fails to teach a next handle in indicators for a destination address to point to an indicator corresponding to a next entry in a packet memory including further payload data for a destination address.

87. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (DCB) (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a next buffer address field (a next handle in a an indicator) of 2 bytes, where this field is used to chain the DCBs, and then their associated data buffers (a next entry in a packet memory including further payload data for a destination address), in a user queue, where then the chained buffers form a message (a next handle in indicators for a destination address to point to an indicator corresponding to a next entry in a packet memory including further payload data for a destination address).

88. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the

multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

89. **In regard to Claim 16**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a payload is written to a packet entry in a packet memory), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (a payload is written to a packet entry in a packet memory, a descriptor is generated for a packet entry including a payload).

90. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf flow index values (a destination address to which a payload in a packet entry addresses by a descriptor is transmitted) (an indicator is generated for a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

91. **In regard to Claim 17**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplankenm, and Tsuchiya teaches a generated indicator.

92. Hassan-Ali fails to teach a handle for each generated indicator addressing an indicator in a queue.

93. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number ‘0’ (an indicator in a queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (addressing an indicator) (a handle for each generated indicator addressing an indicator in a queue).

94. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

95. **In regard to Claim 18**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address and an

indicator associated with a destination address, a header for a destination address, payload from an entry in a packet memory associated with an indicator and a header for a destination address.

96. Hassan-Ali teaches in column 9, lines 12-16, and in FIG. 1 and FIG. 4, a multicast (MC) flow arrangement (FIG. 4) where a root flow entering an ATM environment, e.g., the ATM switch fabric of the access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (transmitting a payload and a header).

97. Hassan-Ali fails to teach using information on a message in an indicator to access a message.

98. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (using information on a message in an indicator to access a message).

99. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the

multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

100. **In regard to Claim 19**, as discussed in the rejection of Claim 13, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address, a header for a destination address, accessing a header for a destination address from an entry in a packet memory addressed by a descriptor identified in an indicator for a destination address.

101. Hassan-Ali teaches in column 9, lines 12-16, and in FIG. 1 and FIG. 4, a multicast (MC) flow arrangement (FIG. 4) where a root flow entering an ATM environment, e.g., the ATM switch fabric of the access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (transmitting, for each destination address, a payload from an entry in a packet memory and a accessed header for a destination address).

102. Hassan-Ali fails to teach using, for each destination address, a message length and offset from an indicator for a destination address to access a header for a destination address from an entry in a packet memory.

103. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an offset from an indicator) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) of 2 bytes which gives a number of

bytes used in a message (a message length from an indicator) (using, for each destination address, a message length and offset from an indicator for a destination address to access a header for a destination address from an entry in a packet memory).

104. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

105. **In regard to Claim 20**, as discussed in the rejection of Claim 13, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a header and a destination address for which an indicator is generated.

106. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5), where root cells (header and payload) are stored, or written to, cell memory locations (entry in a packet memory) using a root index, starting with the head root cell and additional root flow cells as they are

enqueued for a MC (multicast) service (writing headers to each entry in a packet memory including packet payload).

107. Hassan-Ali fails to teach a generated header.

108. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generated header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generated header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generated header) for those destinations (generated headers).

109. Hassan-Ali fails to teach information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated.

110. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (offset) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (message length) of 2 bytes which gives a number of bytes used in a message (message length) (information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated).

111. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

112. **In regard to Claim 21**, as discussed in the rejection of Claim 13, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a payload and an entry in a packet memory addresses by a descriptor identified in an indicator for a destination address.

113. Hassan-Ali fails to teach information on a message length and message offset used to extract a message from an entry for a destination address for which an indicator

is generated, and using, for each destination address, a message length and offset in an indicator for a destination address to access a message for a destination address from an entry in a packet memory.

114. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an offset from an indicator) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) of 2 bytes which gives a number of bytes used in a message (a message length from an indicator) (information on a message length and message offset used to extract a message from an entry for a destination address for which an indicator is generated, and using, for each destination address, a message length and offset in an indicator for a destination address to access a message for a destination address from an entry in a packet memory).

115. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

116. **In regard to Claim 22**, as discussed in the rejection of Claim 13, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches an indicator for a destination address.

117. Hassan-Ali fails to teach writing to a local memory a handle for a destination address addressing an indicator, queuing indicators corresponding to handles in an output queue to a packet queue.

118. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' from FDQCB (queuing indicators in an output queue to a packet queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (indicators corresponding to handles) (writing to a local memory a handle for a destination address addressing an indicator, queuing indicators corresponding to handles in an output queue to a packet queue).

119. Hassan-Ali fails to teach writing handles in local memory to an output queue.

120. Verplanken teaches in column 8, lines 58-60, a next buffer address in an indirect control block is empty except when an indirect control block (handle) is enqueued in a FICBQ (queue) (writing handles in local memory to an output queue).

121. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to

execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

122. **In regard to Claim 23**, as discussed in the rejection of Claim 1, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination packet and an indicator.

123. Hassan-Ali fails to teach information that indicates an output queue to which a destination packet generated from an indicator addressed by a handle is queued.

124. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-42 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' (an indicator in a queue), and data buffer (10) and (11) (a destination packet) are respectively associated to direct control blocks (12) and (13) (indicators), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (writing, to a local memory, information that indicates an output queue to which a destination packet generated from an indicator addressed by a handle is queued).

125. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to

execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

126. **In regard to Claims 24 and 25**, as discussed in the rejections of Claims 13 and 22, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches writing a payload, generating headers, generating a descriptor, generating an indicator, writing handles to a local memory, and writing handles to an output queue, and indicators for a destination address.

127. Hassan-Ali teaches in column 4, lines 50-65, and in column 9, lines 12-16, and in FIG. 1 and FIG. 4, an ATM switch fabric 102 (FIG. 1) (a packet processing block performs operations), where an overall functionality of the switch fabric 102 includes: policing; operation, administration and maintenance (OAM); header translation; queuing; scheduling and traffic shaping; and Connection Admission Control (CAC), and traffic to the fabric 102 is provided via a number of interfaces (operations), and FIG. 4 depicts an exemplary multicast (MC) flow arrangement where a root flow entering an ATM environment, e.g., an ATM switch fabric of an access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces (a transmission block) using a corresponding number of leaf flows (a packet processing block performs operations, a transmission block, circuitry comprises packet engines, where one packet engine

executes a packet processing block and another packet engine executes a transmission block).

128. Hassan-Ali fails to teach handles to access indicators for a destination address to send a message to a destination address.

129. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number ‘0’ (an indicator in a queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (addressing an indicator) (handles to access indicators for a destination address to send a message to a destination address).

130. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

131. **In regard to Claim 29**, Hassan-Ali teaches in column 9, lines 20-25, and in FIG. 4, reference numeral 402 (FIG. 4) refers to an interface that receives an ingress flow 403 (i.e., the root) (FIG. 4) (receiving a multicast packet) that is to be scheduled for emission to N egress interfaces 406-1 through 406-N (FIG. 4) (a multicast packet to transmit to destination addresses), where an ingress flow 403 (FIG. 4) is referred to as a root flow and MC (multicast) flows emitted to egress interfaces are referred to as leaf flows, and, in column 2, lines 51-63, where multicasting is supported in an environment, a single source of traffic (i.e., a root) emits cells or packets to a number of destinations (i.e., leaves) (transmit to destination addresses) that receive the replicated traffic (receiving a multicast packet to transmit to destination addresses).

132. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a descriptor addressing a packet entry in a packet memory including a payload to transmit to destination addresses), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (generating a descriptor addresses a packet entry in a packet memory including a payload to transmit to destination addresses).

133. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized

in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf and root flow index values (for a destination address and a descriptor) (generating, for a destination address, an indicator for a destination address and a descriptor, wherein indicators for destination addresses address descriptors).

134. Hassan-Ali fails to teach generating headers for destination addresses.

135. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generating a header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generating a header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generating a header) for those destinations (generating headers for destination addresses).

136. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Boivie with the invention of Hassan-Ali since Boivie provides a method for efficiently delivering content to multiple requesters over a communications network and allows a server to handle more requests without increasing the actual bandwidth of a connection between the server and the Internet (see Boivie, column 1, lines 7-10 and 43-46), which can be introduced into the system of Hassan-Ali to provide efficient scheduling for handling user requests to servers in a network that employs the system Hassan-Ali in network nodes.

137. Hassan-Ali fails to teach generating an indicator including information on a message.

138. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (generating an indicator including information on a message).

139. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the

multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

140. Hassan-Ali fails to teach information on a header for a destination address.

141. Tsuchiya teaches in paragraph [0032], the length of an IPv4 header itself is stored into a "Header Length" field (information on a header for a destination address).

142. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Tsuchiya with the invention of Hassan-Ali since Tsuchiya provides a method and apparatus of executing IP multicast communications between an IPv4 terminal and an IPv6 terminal (see Tsuchiya, paragraph [0004]), which can be introduced into the system of Hassan-Ali to allow multicast packets to be transferred between different IP networks and to allow multicast communications between users of different IP protocols.

143. **In regard to Claim 30**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a descriptor is generated for each packet entry including a payload), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (a descriptor is generated for each packet entry including a payload).

144. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) associated with a pointer location portion 514B (a descriptor) and relating to the leaf and root flow index values (an indicator is generated for a descriptor and a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

145. Hassan-Ali fails to teach a payload is written to multiple packet entries in a packet memory.

146. Verplanken teaches in column 12, lines 37-39, and in FIG. 9, two data buffers (10) and (11) (FIG. 9) which are stored in a data store represent a message of a user (a payload is written to multiple packet entries in a packet memory).

147. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

148. **In regard to Claim 31**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address, and an indicator for a destination address, and an indicator corresponding to a descriptor addressing an entry in a packet memory including payload data for a destination address.

149. Hassan-Ali fails to teach a next handle in indicators for a destination address to point to an indicator corresponding to a next entry in a packet memory including further payload data for a destination address.

150. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (DCB) (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a next buffer address field (a next handle in a an indicator) of 2 bytes, where this field is used to chain the DCBs, and then their associated data buffers (a next entry in a packet memory including further payload data for a destination address), in a user queue, where then the chained buffers form a message (a next handle in indicators for a destination address to point to an indicator corresponding to a next entry in a packet memory including further payload data for a destination address).

151. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the

multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

152. **In regard to Claim 32**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a payload is written to a packet entry in a packet memory), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (a payload is written to a packet entry in a packet memory, a descriptor is generated for a packet entry including a payload).

153. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf flow index values (a destination address to which a payload in a packet entry addresses by a descriptor is transmitted) (an indicator is generated for a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

154. **In regard to Claim 33**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplankenm, and Tsuchiya teaches a generated indicator.

155. Hassan-Ali fails to teach a handle for each generated indicator addressing an indicator in a queue.

156. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number ‘0’ (an indicator in a queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (addressing an indicator) (a handle for each generated indicator addressing an indicator in a queue).

157. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

158. **In regard to Claim 34**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address and an

indicator associated with a destination address, a header for a destination address, payload from an entry in a packet memory associated with an indicator and a header for a destination address.

159. Hassan-Ali teaches in column 9, lines 12-16, and in FIG. 1 and FIG. 4, a multicast (MC) flow arrangement (FIG. 4) where a root flow entering an ATM environment, e.g., the ATM switch fabric of the access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (transmitting a payload and a header).

160. Hassan-Ali fails to teach using information on a message in an indicator to access a message.

161. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (using information on a message in an indicator to access a message).

162. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the

multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

163. **In regard to Claim 35**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination address, a header for a destination address, accessing a header for a destination address from an entry in a packet memory addressed by a descriptor identified in an indicator for a destination address.

164. Hassan-Ali teaches in column 9, lines 12-16, and in FIG. 1 and FIG. 4, a multicast (MC) flow arrangement (FIG. 4) where a root flow entering an ATM environment, e.g., the ATM switch fabric of the access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces using a corresponding number of leaf flows (transmitting, for each destination address, a payload from an entry in a packet memory and a accessed header for a destination address).

165. Hassan-Ali fails to teach using, for each destination address, a message length and offset from an indicator for a destination address to access a header for a destination address from an entry in a packet memory.

166. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an offset from an indicator) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) of 2 bytes which gives a number of

bytes used in a message (a message length from an indicator) (using, for each destination address, a message length and offset from an indicator for a destination address to access a header for a destination address from an entry in a packet memory).

167. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

168. **In regard to Claim 36**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a header and a destination address for which an indicator is generated.

169. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5), where root cells (header and payload) are stored, or written to, cell memory locations (entry in a packet memory) using a root index, starting with the head root cell and additional root flow cells as they are

enqueued for a MC (multicast) service (writing headers to each entry in a packet memory including packet payload).

170. Hassan-Ali fails to teach a generated header.

171. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generated header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generated header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generated header) for those destinations (generated headers).

172. Hassan-Ali fails to teach information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated.

173. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (offset) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (message length) of 2 bytes which gives a number of bytes used in a message (message length) (information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated).

174. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

175. **In regard to Claim 37**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a payload and an entry in a packet memory addresses by a descriptor identified in an indicator for a destination address.

176. Hassan-Ali fails to teach information on a message length and message offset used to extract a message from an entry for a destination address for which an indicator

is generated, and using, for each destination address, a message length and offset in an indicator for a destination address to access a message for a destination address from an entry in a packet memory.

177. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an offset from an indicator) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) of 2 bytes which gives a number of bytes used in a message (a message length from an indicator) (information on a message length and message offset used to extract a message from an entry for a destination address for which an indicator is generated, and using, for each destination address, a message length and offset in an indicator for a destination address to access a message for a destination address from an entry in a packet memory).

178. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

179. **In regard to Claim 38**, as discussed in the rejection of Claim 129, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches an indicator for a destination address.

180. Hassan-Ali fails to teach writing to a local memory a handle for a destination address addressing an indicator, queuing indicators corresponding to handles in an output queue to a packet queue.

181. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' from FDQCB (queuing indicators in an output queue to a packet queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (indicators corresponding to handles) (writing to a local memory a handle for a destination address addressing an indicator, queuing indicators corresponding to handles in an output queue to a packet queue).

182. Hassan-Ali fails to teach writing handles in local memory to an output queue.

183. Verplanken teaches in column 8, lines 58-60, a next buffer address in an indirect control block is empty except when an indirect control block (handle) is enqueued in a FICBQ (queue) (writing handles in local memory to an output queue).

184. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to

execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

185. **In regard to Claim 39**, as discussed in the rejection of Claim 29, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches a destination packet and an indicator.

186. Hassan-Ali fails to teach information that indicates an output queue to which a destination packet generated from an indicator addressed by a handle is queued.

187. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-42 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' (an indicator in a queue), and data buffer (10) and (11) (a destination packet) are respectively associated to direct control blocks (12) and (13) (indicators), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (writing, to a local memory, information that indicates an output queue to which a destination packet generated from an indicator addressed by a handle is queued).

188. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to

execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

189. **In regard to Claim 40**, as discussed in the rejections of Claims 29 and 38, Hassan-Ali in view of Boivie, Verplanken, and Tsuchiya teaches writing a payload, generating headers, generating a descriptor, generating an indicator, writing handles to a local memory, and writing handles to an output queue, and indicators for a destination address.

190. Hassan-Ali teaches in column 4, lines 50-65, and in column 9, lines 12-16, and in FIG. 1 and FIG. 4, an ATM switch fabric 102 (FIG. 1) (a packet processing block performs operations), where an overall functionality of the switch fabric 102 includes: policing; operation, administration and maintenance (OAM); header translation; queuing; scheduling and traffic shaping; and Connection Admission Control (CAC), and traffic to the fabric 102 is provided via a number of interfaces (operations), and FIG. 4 depicts an exemplary multicast (MC) flow arrangement where a root flow entering an ATM environment, e.g., an ATM switch fabric of an access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces (a transmission block) using a corresponding number of leaf flows (a packet processing block performs operations, a transmission block).

191. Hassan-Ali fails to teach handles to access indicators for a destination address to send a message to a destination address.

192. Verplanken teaches in column 8, lines 3-5, and in column 12, lines 37-39 and 50-56, and in FIG. 9, a free direct control block queue (FDCBQ) gathers all free DCBs (direct control blocks) whose duplication fields store the number '0' (an indicator in a queue), and associated to direct control blocks (DCB) (12) (indicator) and (13) (FIG. 5), there are indirect control blocks (ICB) (14), (15) and (16) (FIG. 5) (handles) which point to the original control block (12) (FIG. 5) (indicator) via the MCCB pointer field represented by darts (14-1), (15-1) and (16-1) (FIG. 5) (addressing an indicator) (handles to access indicators for a destination address to send a message to a destination address).

193. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

194. **Claims 26-28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hassan-Ali in view of Boivie, Verplanken, Tsuchiya, and Mamillapalli et al. (Pub. No.: US 2005/0111452 A1), hereafter referred to as Mamillapalli.

195. **In regard to Claim 26**, Hassan-Ali teaches in column 9, lines 20-25, and in FIG. 4, reference numeral 402 (FIG. 4) refers to an interface that receives an ingress flow 403 (i.e., the root) (FIG. 4) (receiving a multicast packet) that is to be scheduled for emission to N egress interfaces 406-1 through 406-N (FIG. 4) (a multicast packet to transmit to destination addresses), where an ingress flow 403 (FIG. 4) is referred to as a root flow and MC (multicast) flows emitted to egress interfaces are referred to as leaf flows, and, in column 2, lines 51-63, where multicasting is supported in an environment, a single source of traffic (i.e., a root) emits cells or packets to a number of destinations (i.e., leaves) (transmit to destination addresses) that receive the replicated traffic ((a) receive a multicast packet to transmit to destination addresses).

196. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a packet memory) (a packet memory, (b) write a payload of a multicast packet to a packet entry in a packet memory), a descriptor addressing a packet entry in a packet memory including a payload to transmit to destination addresses), where root cells are stored, or written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service ((d) generating a descriptor addresses a packet entry in a packet memory including a payload to transmit to destination addresses).

197. Hassan-Ali teaches in column 4, lines 50-65, and in column 9, lines 12-16, and in FIG. 1 and FIG. 4, an ATM switch fabric 102 (FIG. 1) (a switch fabric), where an overall functionality of the switch fabric 102 includes: policing; operation, administration and maintenance (OAM); header translation; queuing; scheduling and traffic shaping; and Connection Admission Control (CAC), and traffic to the fabric 102 is provided via a number of interfaces (operations), and FIG. 4 depicts an exemplary multicast (MC) flow arrangement where a root flow entering an ATM environment, e.g., an ATM switch fabric of an access node 100 shown in FIG. 1, is transmitted to a plurality of egress interfaces (line cards coupled to a switch fabric) using a corresponding number of leaf flows (line cards coupled to a switch fabric, (ii) circuitry in communication with a packet memory and enabled to perform operations).

198. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to the leaf and root flow index values (for a destination address and a descriptor) ((e) generate, for a destination address, an indicator for a destination address and a descriptor, wherein indicators for destination addresses address descriptors).

199. Hassan-Ali fails to teach generate headers for destination addresses.

200. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that

same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generating a header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generating a header), and data is composed, and in process block 526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generating a header) for those destinations ((c) generate headers for destination addresses).

201. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Boivie with the invention of Hassan-Ali since Boivie provides a method for efficiently delivering content to multiple requesters over a communications network and allows a server to handle more requests without increasing the actual bandwidth of a connection between the server and the Internet (see Boivie, column 1, lines 7-10 and 43-46), which can be introduced into the system of Hassan-Ali to provide efficient scheduling for handling user requests to servers in a network that employs the system Hassan-Ali in network nodes.

202. Hassan-Ali fails to teach generate an indicator including information on a message.

203. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (an indicator including information on a message) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (an indicator including information on a message) of 2 bytes which gives a number of bytes used in a message (generate an indicator including information on a message).

204. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

205. Hassan-Ali fails to teach information on a header for a destination address.

206. Tsuchiya teaches in paragraph [0032], the length of an IPv4 header itself is stored into a "Header Length" field (information on a header for a destination address).

207. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Tsuchiya with the invention of Hassan-Ali since Tsuchiya provides a method and apparatus of executing IP multicast communications

between an IPv4 terminal and an IPv6 terminal (see Tsuchiya, paragraph [0004]), which can be introduced into the system of Hassan-Ali to allow multicast packets to be transferred between different IP networks and to allow multicast communications between users of different IP protocols.

208. Hassan-Ali fails to teach each line card includes a network processor.

209. Mamillapalli teaches in paragraph [0025], and in FIG. 1, nodes 100 and 112-114 (FIG. 1) can be individual systems or components (e.g., line cards), in other words, basically anything that can send, receive, and process messages (each line card includes a network processor). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Mamillapalli with the invention of Hassan-Ali since Mamillapalli provides a method for reliable multicast communication which may include designating which node or nodes to acknowledge a message and/or whether to immediately acknowledge or delay acknowledgement of a message (see Mamillapalli, (see Mamillapalli, paragraphs [0001], [0006], and [0007]), which can be introduced into the system of Hassan-Ali to allow reliable multicast communications to be performed by a node that implements the system of Hassan-Ali.

210. **In regard to Claim 27**, Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B (a descriptor) containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5) (a descriptor is generated for each packet entry including a payload), where root cells are stored, or

written to, cell memory locations using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (a descriptor is generated for each packet entry including a payload).

211. Hassan-Ali teaches in column 11, lines 25-28 and 44-48, and in FIG. 4 and FIG. 5, leaf index values 410-1 through 410-N (FIG. 5) (an indicator) correspond to the N leaf flows (destination address) associated with the root flow 403 (FIG. 4) and are initialized in the head/tail memory 502 (FIG. 5), and where a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) associated with a pointer location portion 514B (a descriptor) and relating to the leaf and root flow index values (an indicator is generated for a descriptor and a destination address to which a payload in a packet entry addressed by a descriptor is transmitted).

212. Hassan-Ali fails to teach a payload is written to multiple packet entries in a packet memory.

213. Verplanken teaches in column 12, lines 37-39, and in FIG. 9, two data buffers (10) and (11) (FIG. 9) which are stored in a data store represent a message of a user (a payload is written to multiple packet entries in a packet memory).

214. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the

multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

215. **In regard to Claim 28**, as discussed in the rejection of Claim 26, Hassan-Ali in view of Boivie, Verplanken, Tsuchiya, and Mamillapalli teaches a header and a destination address for which an indicator is generated.

216. Hassan-Ali teaches in column 11, lines 44-48, and in FIG. 5, a linked buffer 510 (FIG. 5) includes an index portion 514A (FIG. 5) relating to a leaf and root flow index values, and a pointer location portion 514B containing pointers to a cell memory locations 516-1 through 516-K (FIG. 5), where root cells (header and payload) are stored, or written to, cell memory locations (entry in a packet memory) using a root index, starting with the head root cell and additional root flow cells as they are enqueued for a MC (multicast) service (writing headers to each entry in a packet memory including packet payload).

217. Hassan-Ali fails to teach a generated header.

218. Boivie teaches in column 8, line 53 to column 9, line 18, and in FIG. 5 and FIG. 6, in a process block 518 (FIG. 5), if a first and second next hop addresses are not that same, then a process continues with process 522 (FIG. 5), in which a fourth packet including a first address, a first request specific header information (generated header), and data payload is composed, and following process block 522 (FIG. 5), in process block 524 (FIG. 5), a fifth packet including a second address, a second request specific header information (generated header), and data is composed, and in process block

526 (FIG. 4) a fourth packet is transmitted to a first next hop address, and in process block 528 (FIG. 5) fifth packet is transmitted to a second next hop address, and if there were more than two addresses, a router would determine a next hop address for each of the destinations, and then partition the destinations based on their next hops, and a router would send to each next hop a packet that contains the data payload from the original packet, a list of destinations that correspond to that next hop, and a request specific header information (generated header) for those destinations (generated headers).

219. Hassan-Ali fails to teach information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated.

220. Verplanken teaches in column 7, lines 1-8, 20-21 and 33-34, FIG. 3A and FIG. 9, a direct control block (FIG. 3A, and items 12 and 13 in FIG. 9) (an indicator) comprises a buffer chaining control block BCCB (FIG. 3A), which contains an offset field (FIG. 3A) (offset) of 1 byte which indicates the beginning of data in that buffer, and a total message count field (FIG. 3A) (message length) of 2 bytes which gives a number of bytes used in a message (message length) (information on a message in an indicator for a destination address includes a message length and offset used to extract a message from an entry in a packet memory for a destination address for which an indicator is generated).

221. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Verplanken with the invention of Hassan-Ali since Verplanken a method for improving the performance of multicasting by avoiding to execution of useless operations of re-writing and re-deleting the multicast data, and that also save the memory space in the data storage, which can be introduced into the multicasting system of Hassan-Ali to aid in reducing unnecessary memory operations and to aid in more efficient usage of limited memory.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSHUA SMITH whose telephone number is (571)270-1826. The examiner can normally be reached on Monday-Thursday 9:30am-7pm, Alternating Fridays 9:30am-6pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571-272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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